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Research Article

Tooth loss and related factors among the rural adult population in Luangprabang Province, Lao PDR

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Abstract

Introduction: Oral health is an important part of people's physical well-being. Tooth loss is a problem that affects people in Laos in all regions. Until now, there has been a lack of data on tooth loss and related factors in rural areas of Lao PDR.
Objectives: To study tooth loss among the adult population in Luangprabang Province and investigate the factors that contribute to tooth loss.
Methods: A descriptive cross-sectional study was conducted with a sample of 440 participants. The data will be described descriptively, expressed as percentages, and factors associated with tooth loss will be analyzed using the Chi-Square test.
Results: The prevalence of dental caries of the population were 61.1%, with 75.9% having periodontal disease and 74.5% experiencing tooth loss. Factors that may contribute to tooth loss include smoking (P-value $\leq$ 0.009), dental caries, and periodontal disease leading to dental visits in the sample population (P-value $\leq$ 0.001).
Conclusion: The adult population living in rural areas of Luang Prabang province still experiences oral health problems, particularly a high rate of tooth loss.

1. Introduction

Luangprabang is a northern province of the Lao People's Democratic Republic. It is a city with natural attractions and was registered as a World Cultural Heritage City by UNESCO on December 9, 1995 [1]. The oral health status of the Lao people, according to the World Health Organization in 2022, reported that the incidence of dental caries in permanent teeth is 28.4%, periodontal disease in Lao people aged 15 and above is 4.8%, and the rate of tooth loss in individuals aged 20 and above is 2.6%. Oral cancer affects an average of 3.8 people per 100,000. Risk factors that may contribute to oral and dental diseases include a smoking rate of 32.5% in individuals aged 15 and above, and an average alcohol consumption of 12.1 liters per person in a year. Basic oral health care work and prevention efforts are still lacking [2].

The oral health of the Lao people has been a long-standing issue, and research on oral health in the Lao PDR has not been widely disseminated in the public health sector. A study of periodontal disease in a rural area in Vientiane province found that the incidence of periodontal disease in the 35-44 age group ranged from mild, moderate, to severe (0.8%, 60.4%, 37.8%) [3]. The 2^{nd} National Oral Health Survey of the Lao PDR in 2009 reported that nationwide, 69.3% of people aged 35-44 years (DMFT=3.1) had dental caries, and 82.3% of people aged 60 years and older had dental caries (DMFT=6.6). The prevalence of periodontal disease (CPI) in the general population in the 35-44 age group was 89.1% with bleeding gums, 23% with pockets 4-5 mm deep, and 5.3% with pockets 6 mm deep or more. In the 60 and older age group, bleeding gums were present in 76.8% of individuals, 4-5 mm deep pockets in 13.2%, and pockets 6 mm deep or more in 5.3% [4, 5].

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From the above information, it is clear that oral and dental health issues still require attention, research, and monitoring to guide policy-making aimed at preventing and promoting oral and dental health for the Lao people of all ethnic groups. Therefore, we conducted a survey to examine the oral health status and tooth loss of adults in Luang Prabang province as a baseline for future research.

2. Methodology

The cross-sectional descriptive study collected data through interviews and field oral examination of a sample of adults aged 18 and over, with calculated sample size of 440 participants [6]. Data were imported into the computer using Excel and SPSS version 27. Descriptive data analysis was conducted to determine the mean percentage of factors and dental health status based on the DMFT index for caries and the CPI (Community Periodontal Index) [7]. Statistical tests were employed to analyze the relationship between factors contributing to oral health and tooth loss, utilizing tests such as the Chi-Square test based on the variables' characteristics with a significance level set at 0.05.

3. Results

3.1. Population geographic

The sample population participating in this study consisted of 440 people, with 60.5% being female. The most represented age groups were 30-39 years old (20.5%) and 40-49 years old (22.5%), with 44 people (10%) being over 70 years old. The majority of participants had a primary school education (47.3%) or secondary school education (31.1%). The main occupations were farming (45.8%) and trading (34.3%). Most participants were married (88.4%) and the majority of participants had a monthly income of more than 3,000,000 kip (48.2%). The population geography is shown in Tables 1 and 2.

Table 1: Population geographic

Variables	Number	Percent
Sex		
Male	174	39.5
Female	266	60.5
Total	440	100

3.2. Personal illness

The most common diseases among the sample group participating in this study were diabetes (5.5%) and high blood pressure (20.5%) with no history of other diseases Table 3.

Table 3: The personal illness of the sample population

Variables	Sex		Total (%)
	Male (%)	Female (%)	
Diabetes			
Yes	7 (1.6)	17 (3.9)	24 (5.5)
No	167 (38.0)	249 (56.6)	416 (94.6)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
High blood pressure			
Yes	35 (8.0)	55 (12.5)	90 (20.5)
No	139 (31.6)	211 (48.0)	350 (79.5)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**

3.3. Oral cleaning

Oral and dental hygiene: The sample population participating in the study generally practiced good oral hygiene (99.5%). Brushing teeth accounted for 99.3% of the hygiene practices, and participants also used toothpicks and rinsed their mouths with plain water. The majority of participants brushed their teeth twice a day (81.3%) and used tooth paste (97.7%) Table 4.

3.4. Personal habits

The typical behaviors of the population participating in this study included smoking, drinking alcohol, and betel quid chewing. However, betel quid chewing and smoking were still at a low level (3.6% and 13.9%). As for drinking alcohol, the rate was high at 60.5%, but the frequency of drinking was not regular, with 86.8% rarely drinking Table 5.

Table 2: Population geographic compare with sex

Variables	Sex		Total
	Male (%)	Female (%)	
Age			
18-29	19 (4.3)	37 (8.4)	56 (12.7)
30-39	24 (5.5)	66 (15.0)	90 (20.5)
40-49	36 (8.2)	63 (14.3)	99 (22.5)
50-59	38 (8.6)	41 (9.3)	79 (18.0)
60-69	34 (7.7)	38 (8.6)	72 (16.4)
70 and Upper	23 (5.2)	21 (4.8)	44 (10.0)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
Education level			
None	7 (1.6)	17 (3.9)	24 (5.5)
Primary school	73 (16.6)	135 (30.7)	208 (47.3)
Secondary school	66 (15.0)	71 (16.1)	137 (31.1)
High school	23 (5.2)	39 (8.9)	62 (14.1)
College	3 (0.7)	3 (0.7)	6 (1.4)
Bachelor or higher	2 (0.5)	1 (0.2)	3 (0.7)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
Occupation			
None	5 (1.1)	23 (5.2)	28 (6.4)
Farmer	79 (17.9)	123 (27.9)	202 (45.8)
Worker	22 (5.0)	8 (1.8)	30 (6.8)
Trader	55 (12.5)	96 (21.8)	151 (34.3)
Government officials	11 (2.5)	14 (3.2)	25 (5.7)
Retired	2 (0.5)	-	2 (0.5)
Student	-	2 (0.5)	2 (0.5)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
Marriage status			
Single	13 (3.0)	13 (3.0)	26 (5.9)
Married	158 (35.9)	231 (52.5)	389 (88.4)
Divorced	3 (0.7)	22 (5.0)	25 (5.7)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
Monthly income (kip)			
Less than 1,500,000	36 (8.2)	61 (13.9)	97 (22.0)
1,500,000-3,000,000	48 (10.9)	82 (18.6)	130 (29.5)
More than 3,000,000	90 (20.5)	122 (27.7)	212 (48.2)
No income	-	1 (0.2)	1 (0.2)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**

Table 4: The oral and teeth cleaning of the sample population

Variables	Sex		Total (%)
	Male (%)	Female (%)	
Oral cavity cleaning			
Yes	173 (39.3)	265 (60.2)	438 (99.5)
No	1 (0.2)	1 (0.2)	2 (0.4)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
Oral cavity cleaning technic			
Mouth washing	-	1 (0.2)	1 (0.2)
Tooth picking	1 (0.2)	1 (0.2)	2 (0.5)
Tooth brushing	172 (39.3)	263 (60.0)	435 (99.3)
Total	**173 (39.5)**	**265 (60.5)**	**438 (100)**
Frequency of oral and tooth cleanings			
Rarely	12 (2.7)	18 (4.1)	30 (6.8)
1 time/day	3 (0.7)	3 (0.7)	6 (1.4)
2 times/day	135 (30.8)	221 (50.5)	356 (81.3)
3 times/day	23 (5.3)	23 (5.3)	46 (10.5)
Total	**173 (39.5)**	**265 (60.5)**	**438 (100)**
Tooth cleaning materials			
Only brush	2 (0.5)	2 (0.5)	4 (0.9)
Brushed with salt	-	2 (0.5)	2 (0.5)
Brushed with herbal	3 (0.7)	1 (0.2)	4 (0.9)
Brushed with tooth paste	168 (38.4)	260 (59.4)	428 (97.7)
Total	**173 (39.5)**	**265 (60.5)**	**438 (100)**

Table 5: The personal habits of the sample population

Variables	Sex		Total (%)
	Male (%)	Female (%)	
Betel quid chewing			
Yes	6 (1.4)	10 (2.3)	16 (3.6)
No	168 (38.2)	256 (58.2)	424 (96.4)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
Frequency of Betel quid chewing			
Rarely	-	1 (6.3)	1 (6.3)
1 time/day	-	-	-
2 times/day	2 (12.5)	5 (31.3)	7 (43.8)
3 times/day	4 (25.0)	2 (12.5)	6 (37.5)
More than 3 times/day	-	2 (12.5)	2 (12.5)
Total	**6 (37.5)**	**10 (62.5)**	**16 (100)**
Duration of Betel quid chewing			
1 year	-	-	-
3 years	-	2 (12.5)	2 (12.5)
5 years	2 (12.5)	3 (18.8)	5 (31.3)
More than 5 years	4 (25.0)	5 (31.3)	9 (56.3)
Total	**6 (37.5)**	**10 (62.5)**	**16 (100)**
Tobacco smoking			
Yes	57 (13.0)	4 (0.9)	61 (13.9)
No	117 (26.6)	262 (59.5)	379 (86.1)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
Frequency of smoking			
Rarely	7 (11.5)	1 (1.6)	8 (13.1)
3 times/day	5 (8.2)	3 (4.9)	8 (13.1)
More than 3 times/day	45 (73.8)	-	45 (73.8)
Total	**57 (93.4)**	**4 (6.6)**	**61 (100)**
Duration of smoking			
3 years	3 (4.9)	1 (1.6)	4 (6.6)
5 years	1 (1.6)	-	1 (1.6)
More than 5 years	53 (86.9)	3 (4.9)	56 (91.8)
Total	**57 (93.4)**	**4 (6.6)**	**61 (100)**
Alcohol drinking			
Yes	124 (28.2)	142 (32.3)	266 (60.5)
No	50 (11.4)	124 (28.2)	174 (39.5)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
Frequency of drinking			
Rarely	109 (41)	122 (45.9)	231 (86.8)
1 time/day	9 (3.4)	18 (6.8)	27 (10.2)
2 times/day	2 (0.8)	2 (0.8)	4 (1.5)
3 times/day	1 (0.4)	-	1 (0.4)
More than 3 times/day	3 (1.1)	-	3 (1.1)
Total	**124 (46.6)**	**142 (53.4)**	**266 (100)**
Duration of drinking			
1 year	16 (6.0)	24 (9.0)	40 (15.0)
3 years	2 (0.8)	5 (1.9)	7 (2.6)
5 years	4 (1.5)	5 (1.9)	9 (3.4)
More than 5 years	102 (38.3)	108 (40.6)	210 (78.9)
Total	**124 (46.6)**	**142 (53.4)**	**266 (100)**

3.5. Dental service access

In general, people in these areas went to receive dental services (45.7%) at nearby dental clinic facilities, and the most common dental services received are tooth extraction (73.6%), followed by dental treatment (12.4%), dentures (4.5%), and dental health monitoring (9.5%). Only 10.9% of people go for regular dental health check-ups every 6 months, while the majority (72.6%) go every two years Table 6.

3.6. Tooth loss history

Tooth loss among the participants accounted for 74.5% of the cases. The main causes of tooth loss or tooth extraction were periodontal disease (50.3%), dental caries (47.6%), accidents (1.8%), and tooth extraction for orthodontic reasons (0.3%) Table 7.

Table 6: Dental service access of the sample population

Variables	Sex		Total (%)
	Male (%)	Female (%)	
Visiting the dentist			
Yes	85 (19.3)	116 (26.4)	201 (45.7)
No	89 (20.2)	150 (34.1)	239 (54.3)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
The reason of visiting			
Dental treatment	5 (2.5)	20 (10.0)	25 (12.4)
Tooth extraction	66 (32.8)	82 (40.8)	148 (73.6)
Denture	5 (2.5)	4 (2.0)	9 (4.5)
Oral health check-up	9 (4.5)	10 (5.0)	19 (9.5)
Total	**85 (42.3)**	**116 (57.7)**	**201 (100)**
Frequency of Dentist visiting			
Very 3 months	-	1 (0.5)	1 (0.5)
Very 6 months	7 (3.5)	15 (7.5)	22 (10.9)
Very 1 year	9 (4.5)	10 (5.0)	19 (9.5)
Very 2 years	7 (3.5)	6 (3.0)	13 (6.5)
More than 2 years	62 (30.8)	84 (41.8)	146 (72.6)
Total	**85 (42.3)**	**116 (57.7)**	**201 (100)**

Table 7: Cause of tooth loss of the sample population

Variables	Sex		Total (%)
	Male (%)	Female (%)	
Tooth extraction or tooth loss			
Yes	135 (30.7)	193 (39.5)	328 (74.5)
No	39 (8.9)	73 (16.6)	112 (25.5)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
Etiology of tooth loss			
Decayed	57 (17.4)	99 (30.2)	156 (47.6)
Periodontal disease	89 (27.1)	76 (23.2)	165 (50.3)
Accident	4 (1.2)	2 (0.6)	6 (1.8)
Extraction for orthodontic	-	1 (0.3)	1 (0.3)
Total	**149 (45.4)**	**143 (53.9)**	**328 (100)**

3.7. Dental status

The incidence of oral issues in the sample population was found to be 61.1% with tooth decay, 74.5% with missing teeth, and 4.5% with filled teeth Table 8. The highest incidence of tooth decay was in the 30-39 and 40-49 age groups (12.3%, 14.3%), while all age groups showed tooth loss depending on the age. Dental treatment or filled teeth in the sample population were low in each age group, totaling only 3.9% Table 9.

A comprehensive study of the overall dental condition based on the number of teeth (12,320) found that: the total number of teeth with problems (DMF) was 2,296, accounting for 18.6%. Among these, 749 were decayed, 1,515 were missing, and 32 were filled. The average value of the dental health condition (DMFT) was 5.2 teeth per person Table 10.

Table 8: Dental status of the sample population

Variables	Sex		Total (%)
	Male (%)	Female (%)	
Decayed			
Yes	97 (22.0)	172 (39.1)	269 (61.1)
No	77 (17.5)	94 (21.4)	171 (38.9)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
Missing			
Yes	135 (30.7)	193 (43.9)	328 (74.5)
No	39 (8.9)	73 (16.6)	122 (25.5)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**
Filled			
Yes	11 (2.5)	9 (2.0)	20 (4.5)
No	163 (37.0)	257 (58.4)	420 (95.5)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**

Table 9: Comparison of dental status by age group (DMF)

Variables	Decayed		Total (%)	P-value
	Yes (%)	No (%)		
Age group (Year)				
18-29	34 (7.7)	22 (5.0)	56 (12.7)	
30-39	54 (12.3)	36 (8.2)	90 (20.5)	
40-49	63 (14.3)	36 (8.2)	99 (22.5)	**0.982**
50-59	48 (10.9)	31 (7.0)	79 (18.0)	
60-69	45 (10.2)	27 (6.1)	72 (16.4)	
70 and upper	25 (5.7)	19 (4.3)	44 (10.0)	
Total	**269 (61.1)**	**171 (38.9)**	**440 (100)**	
	Missing			
	Yes (%)	**No (%)**		
18-29	30 (6.8)	26 (5.9)	56 (12.7)	
30-39	63 (14.3)	27 (6.1)	90 (20.4)	
40-49	72 (16.3)	27 (6.1)	99 (22.4)	**0.002**
50-59	61 (13.8)	18 (4.0)	79 (17.8)	
60-69	60 (13.6)	12 (2.7)	72 (16.3)	
70 and upper	39 (8.9)	5 (1.1)	44 (10.0)	
Total	**325 (73.9)**	**115 (26.1)**	**440 (100)**	
	Filled			
	Yes (%)	**No (%)**		
18-29	4 (0.9)	52 (11.8)	56 (12.7)	
30-39	4 (0.9)	86 (19.5)	90 (20.4)	
40-49	5 (1.1)	94 (21.3)	99 (22.4)	**0.520**
50-59	1 (0.2)	78 (17.7)	79 (18.0)	
60-69	3 (0.7)	69 (15.7)	72 (16.4)	
70 and upper	3 (0.7)	41 (9.3)	44 (10.0)	
Total	**20 (4.5)**	**420 (96.1)**	**440 (100)**	

Table 10: Dental status according to teeth

Variables	Total (teeth)	Mean
Decayed	749	1.7023
Missing	1,515	3.4432
Filled	32	0.0727
DMFT	**2,296**	**5.2**

3.8. Periodontal status

A study was conducted on the periodontal status of a sample population of 440 people. Clinical examinations and measurements of the depth of the periodontal pocket or Community Periodontal Index (CPI) revealed that only 106 people (24.1%) had a normal periodontal pocket depth (0-3 mm), while 334 people (75.9%) had periodontal disease. Among those with periodontal issues, 58.2% had a pocket depth of 4-5 mm (class I), 13.4% had a depth of 6-8 mm (class II), 2.7% had a depth of 9-11 mm (class III), and 1.6% had a depth of 12 mm or more (class IV) Table 11, 12.

Table 11: Incidence of periodontal disease

Variables	Sex		Total (%)
	Male (%)	Female (%)	
Periodontal disease			
Yes	129 (29.3)	205 (46.6)	334 (75.9)
No	41 (9.3)	65 (14.8)	106 (24.1)
Total	**170 (38.6)**	**270 (61.4)**	**440 (100)**

Table 12: The severity of periodontal disease

Severity level	CPI		Total (%)
	Yes (%)	No (%)	
Glade 0 (0-3 mm)	106 (24.1)	334 (75.9)	440 (100)
Glade I (4-5 mm)	256 (58.2)	184 (41.8)	440 (100)
Glade II (6-8 mm)	59 (13.4)	381 (86.6)	440 (100)
Glade III (9-11 mm)	12 (2.7)	428 (97.3)	440 (100)
Glade IV (12 mm)	7 (1.6)	433 (98.4)	440 (100)

3.9. Oral mucosa status

The oral mucosal condition of the sample population was generally in good condition, with only 1 person (0.2%) suffering from aphthous ulcer among 439 people (99.7%) Table 13.

Table 13: Oral mucosa disease of the sample population

Variables	Sex		Total (%)
	Male (%)	Female (%)	
Oral mucosa disease			
Aphthous ulcer	-	1 (0.2)	1 (0.2)
None	174 (39.5)	265 (60.2)	439 (99.7)
Total	**174 (39.5)**	**266 (60.5)**	**440 (100)**

3.10. Risk factors related to tooth loss

The study of the causes or factors that lead to tooth loss in the sample population participating in this study, from a multi-factorial perspective, including internal factors (identified diseases) and other external factors, revealed the following: Females experienced more tooth loss than males (43.9%). Age was correlated with tooth loss (P-value ≤ 0.002), with tooth loss starting at the age of 18 and above, but most tooth loss occurring at the age of 40 and above. Education level, occupation, income, and personal illness were not statistically significant factors for tooth loss. Oral and dental hygiene, alcohol consumption, and Betel quid chewing were not statistically associated with tooth loss. The smoking status of the sample who smoked (13.8%) was found to be statistically associated with tooth loss (P-value ≤ 0.009), as well as dental visits (P-value ≤ 0.001) Table 14 and 15.

Table 14: Risk factors related to tooth loss

Variables	Tooth loss		Total	P-value
	No (%)	Yes (%)		
Sex				
Male	39 (8.9)	135 (30.7)	174 (39.5)	
Female	73 (16.6)	193 (43.9)	266 (60.5)	**0.236**
Total	**112 (25.5)**	**328 (74.5)**	**440 (100)**	
Age group				
18-29	25 (5.7)	31 (7.0)	56 (12.7)	
30-39	26 (5.9)	64 (14.5)	90 (20.5)	
40-49	26 (5.9)	73 (16.6)	99 (22.5)	**0.002**
50-59	18 (4.1)	61 (13.9)	79 (18.0)	
60-69	12 (2.7)	60 (13.6)	72 (16.4)	
70 and over	5 (1.1)	39 (8.9)	44 (10.0)	
Total	**112 (25.5)**	**328 (74.5)**	**440 (100)**	
Educational level				
None	4 (0.9)	20 (4.5)	24 (5.5)	
Primary school	48 (10.9)	160 (36.4)	208 (47.3)	
Secondary school	33 (7.5)	104 (23.6)	137 (31.1)	**0.107**
High school	23 (5.2)	39 (8.9)	62 (14.1)	
Collage	2 (0.5)	4 (0.9)	6 (1.4)	
Bachelor or higher	2 (0.5)	1 (0.2)	3 (0.7)	
Total	**112 (25.5)**	**328 (74.5)**	**440 (100)**	
Occupation				
None	5 (1.1)	23 (5.2)	28 (6.4)	
Farmer	47 (10.7)	155 (35.2)	202 (45.9)	
Worker	5 (1.1)	25 (5.7)	30 (6.8)	**0.376**
Business man	47 (10.7)	104 (23.6)	151 (34.3)	
Government staff	6 (1.4)	19 (4.3)	25 (5.7)	
Others	1 (0.2)	1 (0.2)	2 (0.5)	
Total	**112 (25.5)**	**328 (74.5)**	**440 (100)**	

Table 15: Risk factors related to tooth loss (continue)

Variables	Tooth loss	**Total**	**P-value**	
Monthly income (kip)				
<1,500,000	18 (4.1)	79 (18.0)	97 (22.0)	
1,500,000-3,000,000	37 (8.4)	93 (21.1)	130 (29.5)	**0.305**
>3,000,000	57 (13.0)	155 (35.2)	212 (48.2)	
Others	0	1 (0.2)	1 (0.2)	
Total	**112 (25.5)**	**328 (74.5)**	**440 (100)**	
Diabetes				
Yes	5 (1.1)	19 (4.3)	24 (5.4)	
No	107 (24.3)	309 (70.2)	416 (94.5)	**0.594**
Total	**112 (25.4)**	**328 (74.5)**	**440 (100)**	
High blood pressure				
Yes	20 (4.5)	70 (15.9)	90 (20.4)	
No	92 (20.9)	258 (58.6)	350 (79.5)	**0.431**
Total	**112 (25.4)**	**328 (74.5)**	**440 (100)**	
Oral cleaning				
Yes	112 (25.4)	326 (74.0)	438 (99.5)	
No	-	2 (0.4)	2 (0.4)	**0.999**
Total	**112 (25.4)**	**328 (74.5)**	**440 (100)**	
Betel quid chewing				
Yes	4 (0.9)	12 (2.7)	16 (3.6)	
No	108 (24.5)	316 (71.8)	424 (96.3)	0.966
Total	**112 (25.4)**	**328 (74.5)**	**440 (100)**	
Tobacco smoking				
Yes	7 (1.5)	54(12.2)	61 (13.8)	
No	105 (23.8)	274 (274)	379 (86.1)	**0.009**
Total	**112 (25.4)**	**328 (74.5)**	**440 (100)**	
Alcohol drinking				
Yes	70 (15.9)	196 (44.5)	266 (60.5)	
No	42 (9.5)	132 (30.0)	174 (39.5)	**0.608**
Total	**112 (25.4)**	**328 (74.5)**	**440 (100)**	
Dentist visits				
Yes	21 (4.7)	180 (40.9)	201 (45.6)	
No	91 (20.6)	148 (33.6)	239 (54.3)	**0.001**
Total	**112 (25.4)**	**328 (74.5)**	**440 (100)**	

4. Dicussion

Study on the oral health of adults in Luang Prabang Province, Lao PDR. The results of the study found that the total sample population was 440 people, of which 60.5% were female. The most participating age groups were 30-39 years (20.5%) and 40-49 years (22.5%), with 44 people over 70 years old (10%). The education level of most people was primary school (47.3%) and secondary school (31.1%). The majority of the population were engaged in farming (45.8%) and trading (34.5%). The status of the sample population participating in this study was mostly married (88.4%). The monthly income of most people participating in this study was more than 3,000,000 kip per month (48.2%). The most common diseases among the sample group participating in this study were high blood pressure (20.5%) and diabetes (5.5%), while there was no history of other diseases.

Oral and dental hygiene: The sample population participating in the study generally cleaned their mouths and teeth (99.5%), with brushing their teeth accounting for 99.3%. Additionally, they used toothpicks and rinsed their mouths with plain water. The majority cleaned their mouths or brushed their teeth twice a day (81.3%), and most people used toothpaste (97.7%). The frequency of cleaning their mouths and teeth was within the normal range of twice a day, along with the use of toothpaste available in the market [8].

The typical behaviors of the population participating in this study included smoking, drinking alcohol, and betel quid chewing. However, betel quid chewing and smoking were still at a low level (3.6% and 13.9%, respectively). The rate of drinking alcohol was high at 60.5%, but the frequency of drinking was irregular, with 86.8% reporting drinking for a long time at one time. These typical behaviors pose a risk for oral and dental health problems, particularly dental caries, periodontal disease, and oral mucosal disease [9–11].

The sample population received dental services at a rate of 45.7%, with the most common procedures being tooth extraction (73.6%), followed by dental treatment (12.4%), dentures (4.5%), and dental check-ups and monitoring (9.5%). The level of attention given to oral and dental health care is still low compared to the standard of dental care, such as regular check-ups every 6 months (only 10.9%), with most individuals only visiting once (72.6%). Compared to other countries, the number of people who visited dental services is still low [12, 13].

4.1. Dental status

The dental health status, based on the number of people or the incidence rate in the sample population, was found to be 61.1% tooth decay, 74.5% missing teeth, and 4.5% crowded teeth. The highest incidence of tooth decay was in the age groups of 30-39 and 40-49 years (12.3%, 14.3%), while the age group with the highest tooth loss was 50 years and above (13.6%, 13.6%, and 8.9%). Compared to people without tooth loss in the same age group, dental treatment or crowded teeth in the sample population was low in each age group, totaling only 4.5%.

This data highlights the poor dental health of the people in the area, as evidenced by the high rates of tooth decay and missing teeth. However, the rates of crowded teeth or those seeking dental treatment are still low compared to oral health data worldwide and in countries in Southeast Asia [14–18].

The overall assessment of dental health based on the number of teeth (12,320 teeth) revealed that the total number of teeth with problems (DMF) was 2,296, accounting for 18.6%. This included 749 decayed teeth, 1,515 missing teeth, and 32 filled teeth. The average value of dental health status (DMFT) was 5.2 teeth per person Table 9. This data indicates that the overall dental health status of the sample population is still relatively high compared to the study data in Burma [19]. However, when compared to data from Thailand in the adult group aged 30-59 years old, the incidence of dental caries and the dental caries index are similar [20, 21], as well as in studies conducted in Cambodia [22] and Vietnam [23]. A study in the elderly in urban Luangprabang Capital found that the incidence of dental caries was as high as 96.4%, with a dental caries index value of 15.1, indicating a higher prevalence of dental caries compared to the current study. This is because the data in the current study are aggregated for all age groups aged 18 and over, without specific classification of the dental index value by age group of the population [24].

4.2. Periodontal status

Upon examination and measurement of the depth of the dental pockets, it was revealed that only 24.1% had normal dental pocket depth (0-3 mm). Furthermore, periodontal issues arose when the depth of the dental pockets ranged from 4 mm to 12 mm, constituting 75.9% of the population. Within this range, 58.2% had a depth of 4-5 mm, 13.4% had a depth of 6-8 mm, 2.7% had a depth of 9-11 mm, and 1.6% had a depth of 12 mm or more. This study indicated a high incidence of periodontal disease in the sample group, particularly in cases where the depth of the dental pocket was 4 mm or greater, aligning with existing studies and classifications of periodontal disease severity in Thailand [25].

4.3. Oral mucosa status

The oral mucosa of the sample population was generally normal, with no serious diseases, with only 0.2% having an aphthous ulcer. Therefore, from the evaluation and analysis of the oral mucosa of the sample group, it was found that there were no issues with the oral mucosa, and it was at a low or normal level compared to other studies that found oral mucosa diseases in each survey [26–28].

4.4. Factors related to missing teeth

The prevalence of teeth lost in this study was 74.5%. The main causes of tooth loss or extraction were periodontal disease (50.3%), dental caries (47.6%), accidents (1.8%), and tooth extraction for orthodontic reasons (0.3%). Tooth loss in this population group was found to be high compared to a study in Poland in the age group of 20 years and older, which was only 15.4% [29]. The main risk factors related to tooth loss in this study were periodontal disease and dental caries, which are similar to the study in Brazil [30] and the study in Vientiane Capital in 2012 on tooth loss and factors associated with tooth loss [31].

The study examined factors contributing to tooth loss in the sample population. It was found that age is significantly associated with tooth loss (P-value ≤ 0.002), with tooth loss typically starting at age 18 and increasing with age. Gender, education level, occupation, and income were not statistically linked to tooth loss. Among the participants, 5.4% had a history of diabetes, with 4.3% of them experiencing tooth loss, showing a statistical relationship (P-value ≤ 0.594). Additionally, 20.4% of participants had high blood pressure, with 15.9% of them experiencing tooth loss, though not statistically significant (P-value ≤ 0.431). Factors such as oral hygiene, alcohol consumption, and betel quid chewing were not statistically associated with tooth loss. However, smoking status was significantly related to tooth loss (P-value ≤ 0.009), with 13.8% of smokers experiencing tooth loss. Furthermore, among the 45.6% participants who lost or extracted teeth, the number of individuals who visited the dentist was statistically significant (P-value ≤ 0.001). The data suggests that tooth loss may be linked to dietary habits, smoking, severe dental issues like caries or periodontal disease, and the need for extractions due to untreated dental problems. These findings align with previous studies that have identified smoking, drinking, dental issues, and accidents as potential factors contributing to tooth loss [31–36].

5. Conclusion

The oral health in rural areas of Luang Prabang province reveals poor conditions. Tooth loss may be caused by smoking behavior, dental caries, and periodontal disease, which lead to oral health problems, especially pain and disrupt people's lives. As a result, they go to the dentist to extract teeth to solve the initial problem. However, the result is tooth loss that affects the physiological functioning of the oral cavity and teeth.

The results of this study indicate that the oral and dental health of adults living in Luang Prabang province is not as good as it should be, especially dental caries, periodontal disease, and tooth loss are still high.

Article Information

Consent: All participants were provided with details of the research, asked to voluntarily participate in the study, and signed a consent form.

Ethical Approval: The ethical approval for this study was granted by the ethics committee of the University of Health Sciences, Lao PDR. Ref. No. 825/IREC. 15 Jul 2024.

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Disclaimer (Artificial Intelligence): The author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.), and text-to-image generators have been used during writing or editing of manuscripts.

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